

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

IRRIGATION STORAGE RESERVOIR

(No. and Ac-Ft)

CODE 436

DEFINITION

An irrigation water storage structure made by constructing a dam, embankment, or pit.

PURPOSE

Conserve water by holding it in storage until it is used to meet crop irrigation requirements.

CONDITION WHERE PRACTICE APPLIES

This practice applies to irrigation water storage structures that meet all the following criteria:

1. The water supply available to the irrigated area is insufficient to meet conservation irrigation requirements during part or all of the irrigation season.
2. Water is available for storage from surface runoff, streamflow, or a subsurface source.
3. A suitable site is available for the construction of a storage reservoir.

This standard pertains to the planning and functional design of irrigation storage reservoirs. Storage reservoirs shall be planned and located to serve as an integral part of an irrigation system.

This standard does not apply to Irrigation Regulating Reservoirs (552) designed primarily for flow control or to store water for a few hours or days. It does not include detailed design criteria or construction specifications for individual structures or components of the storage facility.

CRITERIA

The installation and operation of an Irrigation Storage Reservoir shall comply with all federal, state and local laws, rules and regulations.

The criteria for the design of components not addressed in NRCS conservation practice standards shall be consistent with sound engineering principles.

Irrigation. The amount of water required to meet variations in water demand within the growing season must be determined to calculate storage requirements. All demand hydrographs shall be computed from the consumptive use-time relationship. Demand hydrographs shall be adjusted to reflect anticipated irrigation efficiency, conveyance losses, and any other consumptive uses, such as leaching or frost control.

Storage. Irrigation storage reservoirs shall be designed to satisfy irrigation requirements in the design area, unless limited by reservoir site characteristics, available watershed yield, or limitations imposed by water rights. Additional capacity shall be provided as needed for sediment storage.

Water releases shall be those increments of the water demand hydrograph that exceed the available direct flows from other sources.

Capacity. Reservoir capacity required to satisfy irrigation demands shall be computed according to the length of the storage period, the anticipated inflow and outflow during this period, and the expected seepage and evaporation losses.

If storage capacity is limited, benefits may be evaluated on the basis of the more frequent availability of water to satisfy irrigation demands for the design area.

Type of structures. The type of dam, embankment, or pit and appurtenant structures shall be based on site-specific hydrologic studies, engineering, geologic investigations, and construction materials.

Foundation, embankment, and spillway. Earthen dams, embankments, and appurtenant structures shall be designed to meet the criteria in the NRCS conservation practice standard for Pond, Code 378 or in TR-60, as appropriate.

Irrigation pits meeting the definition of excavated ponds shall be designed according to the criteria for excavated ponds in the NRCS conservation practice standard for Pond, Code 378.

Drop spillways, chute spillways, and box spillways shall be designed according to the principles of the Engineering Field Handbook and the National Engineering Handbook, Section 5 - Hydraulics; Section 11 - Drop Spillways; or Section 14 - Chute Spillways, as appropriate.

Overflow protection. Overflow protection shall be provided for enclosed embankments.

Outlet works. Outlet works shall be provided for the controlled withdrawal or release of irrigation water. Outlet works may consist of a direct pumping system, or a gated conduit through or over the dam for gravitational flow to the irrigated area, to a pumping plant or another storage facility.

The capacity of the outlet works shall be sufficient to meet peak period irrigation system demands.

CONSIDERATIONS

When planning this practice the following items should be considered, as applicable:

- Short-term and construction-related effects on the quality of downstream water courses.

- Potential for earth moving during construction to uncover or redistribute toxic materials.

Consider the effects on:

- The water budget, especially on evaporation, transpiration rates of runoff, infiltration, percolation, and ground water recharge.
- Downstream flows or aquifers that would affect other water uses or users.
- The volume of downstream flow that could have undesirable environmental, social, or economic effects.
- Erosion, sediment, soluble contaminants, and contaminants attached to sediment in runoff.
- The movement of dissolved substances to ground water.
- Downstream waters such as water temperature changes that could cause undesirable effects on aquatic and wildlife communities.
- Wetlands or water-related wildlife habitats.
- The visual quality of water resources.
- Cultural resources.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation storage reservoirs shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan shall be prepared for use by the landowner or operator. The plan shall provide specific instructions for operating and maintaining facilities to ensure they function properly. The plan shall include the following provisions:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.

- Periodic checks and removal of debris from trash racks and from inlet and outlet structures to assure proper operation.
- Periodic removal of sediment to maintain design capacity and efficiency.
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.
- Periodic inspection and maintenance of embankments and earth spillways to control erosion and undesirable vegetation.
- Periodic water quality analysis as necessary to evaluate nutrients, pesticides, and pathogens.

REFERENCES

Massachusetts Irrigation Guide

National Engineering Handbook, USDA-NRCS

Part 623, Irrigation

Part 634, Hydraulic Engineering

Part 650, Engineering Field Handbook

Chapter 3, Hydraulics

Chapter 15, Irrigation

Part 652, Irrigation Guide